

=&gt; d que stat

L2 1 SEA FILE=REGISTRY ABB=ON PLU=ON PALLADIUM/CN  
 L3 5 SEA FILE=REGISTRY ABB=ON PLU=ON (1314-13-2 AND  
 7440-05-3)/CRN  
  
 L4 103 SEA FILE=REGISTRY ABB=ON PLU=ON (ZN(L)O(L)PD)/ELS  
 L5 7 SEA FILE=REGISTRY ABB=ON PLU=ON (L3 OR L4) AND 3/ELC.SUB  
 L6 111 SEA FILE=REGISTRY ABB=ON PLU=ON (ZN(L)O)/ELS AND  
 2/ELC.SUB  
 L7 1 SEA FILE=CAPLUS ABB=ON PLU=ON L3/CAT OR L5/CAT  
 L8 1409 SEA FILE=CAPLUS ABB=ON PLU=ON L6 AND L2  
 L9 690 SEA FILE=CAPLUS ABB=ON PLU=ON L8 AND CAT/RL  
 L10 691 SEA FILE=CAPLUS ABB=ON PLU=ON L7 OR L9  
 L11 53782 SEA FILE=CAPLUS ABB=ON PLU=ON PORE(2A) (SIZE OR VOLUME OR  
 MICRON OR MU)  
 L12 10 SEA FILE=CAPLUS ABB=ON PLU=ON L10 AND L11  
 L13 1 SEA FILE=REGISTRY ABB=ON PLU=ON RUTHENIUM/CN  
 L14 1 SEA FILE=REGISTRY ABB=ON PLU=ON CERIUM/CN  
 L15 1 SEA FILE=REGISTRY ABB=ON PLU=ON ZIRCONIA/CN  
 L16 1 SEA FILE=REGISTRY ABB=ON PLU=ON ALUMINA/CN  
 L17 4 SEA FILE=REGISTRY ABB=ON PLU=ON (7440-05-3 OR  
 7440-18-8)/CRN  
 AND 7440-45-1/CRN AND (1314-23-4 OR 1344-28-1)/CRN.  
 L18 3 SEA FILE=REGISTRY ABB=ON PLU=ON ((PD OR RU) (L)CE (L) (ZR  
 OR  
 AL) (L)O)/ELS AND 4/ELC.SUB  
 L19 7 SEA FILE=REGISTRY ABB=ON PLU=ON L17 OR L18  
 L20 2 SEA FILE=CAPLUS ABB=ON PLU=ON L19/CAT  
 L21 462 SEA FILE=CAPLUS ABB=ON PLU=ON (L13 OR L2) AND L14 AND  
 (L15  
 OR L16) AND CAT/RL  
 L22 377 SEA FILE=CAPLUS ABB=ON PLU=ON CERIUM(2A) PROMOT?  
 L23 14 SEA FILE=CAPLUS ABB=ON PLU=ON L21 AND L22  
 L24 84 SEA FILE=CAPLUS ABB=ON PLU=ON (L13 OR L2 OR RU OR PD OR  
 RUTHENIUM OR PALLADIUM) (L) (CERIUM OR CE OR L14) (L) (L15 OR  
 ZRO?  
 OR ZIRCONIA OR AL2O3 OR ALUMINA OR L16) (L) PROMOT? AND  
 CAT/RL  
 L25 11 SEA FILE=CAPLUS ABB=ON PLU=ON  
 (PALLADIUM-RUTHENIUM) (L) (ZIRCON  
 IA OR ALUMINA OR ZRO? OR AL2O3) AND CAT/RL  
 L26 116 SEA FILE=CAPLUS ABB=ON PLU=ON L12 OR L20 OR L24 OR L23  
 OR  
 L25  
 L27 8937 SEA FILE=CAPLUS ABB=ON PLU=ON (STEAM OR WATER(2A) GAS OR

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8/10/2004

L28           WATER (2A) VAPOR) (2A) REFORMING OR HYDROFORMING  
53 SEA FILE=CAPLUS ABB=ON PLU=ON (METHYL OR ETHYL OR PROPYL  
OR  
ISOPROPYL OR BUTYL OR ISOBUTYL OR T-BUTYL) (L) (ALCOHOL OR  
ALC) (L) REFORMING OR METHAFORMING  
L29           2377 SEA FILE=CAPLUS ABB=ON PLU=ON (METHANOL OR ETHANOL OR  
PROPANOL OR ISOPROPANOL OR BUTANOL OR ISOBUTANOL OR  
T-BUTANOL  
OR MEOH OR ETOH OR PROH OR I-PROH OR BUOH OR I-BUOH OR  
T-BUOH) (L) (REFORMING)  
L30           6 SEA FILE=CAPLUS ABB=ON PLU=ON (L27 OR L28 OR L29) AND  
L26

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L30 ANSWER 1 OF 6 CAPLUS COPYRIGHT 2004 ACS on STN  
ACCESSION NUMBER: 2003:697712 CAPLUS  
DOCUMENT NUMBER: 140:114038  
TITLE: CeO<sub>2</sub>-Al<sub>2</sub>O<sub>3</sub>-supported noble metal catalysts for  
**steam reforming** of hydrocarbons for  
fuel cells  
AUTHOR(S): Zheng, Jian; Strohm, James Jon; Song, Chunshan  
CORPORATE SOURCE: Clean Fuels and Catalysis Program, The Energy  
Institute, and Department of Energy &  
Geo-Environmental Engineering, Pennsylvania State  
University, University Park, PA, 16802, USA  
SOURCE: Preprints of Symposia - American Chemical Society,  
Division of Fuel Chemistry (2003), 48(2), 743-745  
CODEN: PSADFZ; ISSN: 1521-4648  
PUBLISHER: American Chemical Society, Division of Fuel  
Chemistry  
DOCUMENT TYPE: Journal; (computer optical disk)  
LANGUAGE: English  
AB Various metals (Rh, Ru, Ir, Pt, Pd, Ni) supported on  
CeO<sub>2</sub>-promoted Al<sub>2</sub>O<sub>3</sub> were studied for **steam**  
**reforming** of liq. hydrocarbons such as jet fuel. At higher  
temps., .apprx.800°, Ir/CeO<sub>2</sub>-Al<sub>2</sub>O<sub>3</sub> catalyst showed the  
highest activity for **steam reforming** of lower  
hydrocarbons among all the the CeO<sub>2</sub>-Al<sub>2</sub>O<sub>3</sub> supported noble metal  
catalysts. However, at lower temps., .apprx.500°, Ir lost its  
superiority to Rh and Ru. **Ce promoted** the  
**steam reforming** of hydrocarbons by improving the  
activity and coke resistance of Rh and Ir supported catalysts.  
CC 52-1 (Electrochemical, Radiational, and Thermal Energy Technology)

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Section cross-reference(s): 67

ST ceria alumina noble metal catalyst hydrocarbon **steam reforming**; fuel cell hydrocarbon catalytic **steam reforming**

IT Alkanes, uses  
 RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PROC (Process);

USES (Uses)  
 (C12-14; noble metal catalysts supported on ceria-promoted alumina for **steam reforming** of liq. hydrocarbons for fuel cells)

IT Hydrocarbons, uses  
 RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PROC (Process);

USES (Uses)  
 (liq.; noble metal catalysts supported on ceria-promoted alumina for **steam reforming** of liq. hydrocarbons for fuel cells)

IT Fuel cells  
 Jet aircraft fuel  
**Steam reforming** catalysts  
 (noble metal catalysts supported on ceria-promoted alumina for **steam reforming** of liq. hydrocarbons for fuel cells)

IT Noble metals  
 RL: CAT (Catalyst use); USES (Uses)  
 (noble metal catalysts supported on ceria-promoted alumina for **steam reforming** of liq. hydrocarbons for fuel cells)

IT 1306-38-3, Cerium dioxide, uses 1344-28-1, Alumina, uses  
 RL: CAT (Catalyst use); USES (Uses)  
 (catalyst support; noble metal catalysts supported on ceria-promoted alumina for **steam reforming** of liq. hydrocarbons for fuel cells)

IT 7439-88-5, Iridium, uses 7440-02-0, Nickel, uses 7440-05-3, Palladium,  
 uses 7440-06-4, Platinum, uses 7440-16-6, Rhodium, uses 7440-18-8,  
 Ruthenium, uses  
 RL: CAT (Catalyst use); USES (Uses)  
 (noble metal catalysts supported on ceria-promoted alumina for **steam reforming** of liq. hydrocarbons for fuel cells)

REFERENCE COUNT: 18 THERE ARE 18 CITED REFERENCES AVAILABLE FOR THIS

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RECORD. ALL CITATIONS AVAILABLE IN THE RE

FORMAT

L30 ANSWER 2 OF 6 CAPLUS COPYRIGHT 2004 ACS on STN

ACCESSION NUMBER: 2002:814702 CAPLUS

DOCUMENT NUMBER: 137:313542

TITLE: Integrated fuel processor, fuel cell stack, and  
tailINVENTOR(S): gas oxidizer with carbon dioxide removal  
Stevens, James F.

PATENT ASSIGNEE(S): Texaco Inc., USA

SOURCE: U.S. Pat. Appl. Publ., 14 pp.

CODEN: USXXCO

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 2002155329	A1	20021024	US 2002-126679	20020418
US 6682838	B2	20040127		
WO 2002085783	A2	20021031	WO 2002-US12368	20020418
WO 2002085783	A3	20021212		

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH,  
CN,  
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE,  
GH,  
GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK,  
LR,  
LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM,  
PH,  
PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT,  
TZ,  
UA, UG, UZ, VN, YU, ZA, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU,  
TJ, TM  
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AT, BE,  
CH,  
CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE,  
TR,  
BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG  
EP 1390292 A2 20040225 EP 2002-764238 20020418  
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC,  
PT,  
IE, SI, LT, LV, FI, RO, MK, CY, AL, TR

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NO 2003004656 A 20031017 NO 2003-4656 20031017  
 PRIORITY APPLN. INFO.: US 2001-284684P P  
 20010418 WO 2002-US12368 W  
 20020418  
 AB An illustrative method for converting hydrocarbon fuel to hydrogen rich gas, includes the steps of: reacting the hydrocarbon fuel with steam in the presence of reforming catalyst and a carbon dioxide fixing material to produce a first hydrogen gas; and removing carbon monoxide from the first hydrogen gas to produce the hydrogen rich gas, wherein the removing step utilizes a process selected from methanation or selective oxidn. In one illustrative embodiment the carbon dioxide fixing material is selected from calcium oxide, calcium hydroxide, strontium oxide, strontium hydroxide, and/or minerals. The reforming catalyst in one preferred and illustrative embodiment is selected from nickel, platinum, rhodium, palladium, ruthenium, or similar supported reforming catalysts or combinations of these. In such instances the reforming catalyst is preferably supported on a high surface area support thus promoting the reforming reaction and more preferably is selected from alumina, titania, zirconia, or similar such compds. or combinations of these. It is preferred that in one illustrative embodiment that the temp. of the reacting step is from about 400° to about 800°.

IC ICM H01M008-06  
 ICS C01B003-34  
 NCL 429017000  
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
 Section cross-reference(s): 53  
 IT Exhaust gases (engine)  
 Fuel cells  
 Steam reforming catalysts  
 Waste gases  
 (integrated fuel processor, fuel cell stack, and tail gas oxidizer with carbon dioxide removal)

IT Fuel gas manufacturing  
 (steam reforming; integrated fuel processor, fuel cell stack, and tail gas oxidizer with carbon dioxide removal)

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IT 7440-02-0, Nickel, uses 7440-05-3, Palladium, uses 7440-06-4, Platinum, uses 7440-16-6, Rhodium, uses 7440-18-8, Ruthenium, uses  
RL: **CAT (Catalyst use)**; USES (Uses)  
(integrated fuel processor, fuel cell stack, and tail gas oxidizer  
with carbon dioxide removal)  
IT 1314-23-4, Zirconia, uses 1344-28-1, Alumina, uses 13463-67-7, Titania, uses  
RL: **CAT (Catalyst use)**; USES (Uses)  
(support; integrated fuel processor, fuel cell stack, and tail gas oxidizer with carbon dioxide removal)

L30 ANSWER 3 OF 6 CAPLUS COPYRIGHT 2004 ACS on STN

ACCESSION NUMBER: 2002:64236 CAPLUS

DOCUMENT NUMBER: 136:91503

TITLE: Copper-free and non-noble metal catalyst for preparing

hydrogen by oxidizing and **reforming methanol**

INVENTOR(S):  
Shufeng;

Hong, Xuelun; Wu, Diyong; Wang, Shudong; Liu,

PATENT ASSIGNEE(S):  
of

Zhang, Peng; Qi, Aidu  
Dalian Inst. of Chemical Physics, Chinese Academy of Sciences, Peop. Rep. China

SOURCE:

Faming Zhuanli Shenqing Gongkai Shuomingshu, 5 pp.  
CODEN: CNXXEV

DOCUMENT TYPE:

Patent

LANGUAGE:

Chinese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
-----	----	-----	-----	-----
CN 1305867	A	20010801	CN 2000-110040	20000119
			CN 2000-110040	

PRIORITY APPLN. INFO.:  
20000119

AB The catalyst is composed of active components from two of V, Cr, Mn, Zn,  
Mo, Fe, Co, Ni and **Ru**, **promoters** from one or more of La, **Ce** and Y 1-10%, and an addnl. carrier 1-90%. The carrier is selected from one of SiO<sub>2</sub>, ZrO<sub>2</sub> and Al<sub>2</sub>O<sub>3</sub>. The catalyst has high activity, selectivity, and stability for synthesis of hydrogen by oxidizing and **reforming methanol**.

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IC ICM B01J023-16  
ICS B01J023-74; B01J023-76  
CC 67-1 (Catalysis, Reaction Kinetics, and Inorganic Reaction Mechanisms)  
Section cross-reference(s): 49  
ST **reforming** oxidizing catalyst transition metal silica alumina  
**methanol** hydrogen; zirconium oxide transition metal  
**reforming** oxidizing catalyst **methanol** hydrogen  
IT Oxidation catalysts  
Reforming catalysts  
(Copper-free and non-noble metal catalyst for prepg. hydrogen by  
oxidizing and **reforming methanol**)  
IT 1314-23-4, Zirconium oxide (ZrO<sub>2</sub>), uses 1344-28-1, Alumina, uses  
7439-89-6, Iron, uses 7439-91-0, Lanthanum, uses 7439-96-5,  
Manganese,  
uses 7439-98-7, Molybdenum, uses 7440-02-0, Nickel, uses  
7440-45-1,  
Cerium, uses 7440-47-3, Chromium, uses 7440-48-4, Cobalt, uses  
7440-62-2, Vanadium, uses 7440-65-5, Yttrium, uses 7440-66-6,  
Zinc,  
uses 7631-86-9, Silica, uses  
RL: CAT (Catalyst use); RCT (Reactant); RACT (Reactant or  
reagent); USES (Uses)  
(Copper-free and non-noble metal catalyst for prepg. hydrogen by  
oxidizing and **reforming methanol**)  
IT 67-56-1, **Methanol**, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(Copper-free and non-noble metal catalyst for prepg. hydrogen by  
oxidizing and **reforming methanol**)  
IT 1333-74-0P, Hydrogen, preparation  
RL: SPN (Synthetic preparation); PREP (Preparation)  
(Copper-free and non-noble metal catalyst for prepg. hydrogen by  
oxidizing and **reforming methanol**)

L30 ANSWER 4 OF 6 CAPLUS COPYRIGHT 2004 ACS on STN  
ACCESSION NUMBER: 2001:731312 CAPLUS  
DOCUMENT NUMBER: 135:290842  
TITLE: Reforming catalysts and methods of alcohol  
**steam reforming**  
INVENTOR(S): Wang, Yong; Tonkovich, Anna Lee Y.; Hu, Jianle  
PATENT ASSIGNEE(S): USA  
SOURCE: U.S. Pat. Appl. Publ., 13 pp., Cont.-in-part of  
U.S.  
Ser. No. 640,903.  
CODEN: USXXCO  
DOCUMENT TYPE: Patent

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LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 9  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 2001026782	A1	20011004	US 2001-788294	20010216
US 6488838	B1	20021203	US 1999-375614	19990817
US 6680044	B1	20040120	US 2000-640903	20000816
WO 2002066370	A2	20020829	WO 2002-US4527	20020215
WO 2002066370	A3	20030403		

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, BR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG

PRIORITY APPLN. INFO.:  
 19990817 US 1999-375614 A2  
 20000816 US 2000-640903 A2  
 20010216 US 2001-788294 A  
 20020213 US 2002-76881 A

AB H is manufd. by **steam-reforming MeOH** over a porous catalyst contg. Pd and(or) Ru on ZnO, Al<sub>2</sub>O<sub>3</sub>, or ZrO<sub>2</sub>, optionally doped with Ce, having ≥20% pores with size 0.1-300 μm at ≥1 1.5 mol MeOH/g catalyst h. This process is useful in fuel cells.

IC ICM B01J008-02  
 NCL 422211000  
 CC 49-1 (Industrial Inorganic Chemicals)

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- Section cross-reference(s): 52, 67
- ST **steam reforming catalyst methanol palladium**  
zinc oxide; fuel cell hydrogen manuf **steam reforming**  
catalyst; cerium zirconia **steam reforming catalyst**  
**methanol**; ruthenium alumina **steam reforming**  
catalyst **methanol**
- IT **Steam reforming**  
**Steam reforming catalysts**  
Synthesis gas manufacturing  
(**reforming catalysts for steam reforming**  
of **methanol** in manuf. of hydrogen)
- IT Fuel cells  
**Steam**  
(**reforming catalysts for steam reforming**  
of **methanol** in manuf. of hydrogen for fuel cells)
- IT 1314-13-2, Zinc oxide, uses 1314-23-4, Zirconia, uses  
1344-28-1, Alumina, uses  
RL: CAT (Catalyst use); USES (Uses)  
(**reforming catalysts for steam reforming**  
of **methanol** in manuf. of hydrogen)
- IT 7440-05-3P, Palladium, preparation 7440-18-8P, Ruthenium,  
preparation 12014-74-3P, Cerium oxide (CeO)  
RL: CAT (Catalyst use); IMF (Industrial manufacture); PREP  
(Preparation); USES (Uses)  
(**reforming catalysts for steam reforming**  
of **methanol** in manuf. of hydrogen)
- IT 1333-74-0P, Hydrogen, preparation  
RL: IMF (Industrial manufacture); PREP (Preparation)  
(**reforming catalysts for steam reforming**  
of **methanol** in manuf. of hydrogen)
- IT 67-56-1, **Methanol**, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(**reforming catalysts for steam reforming**  
of **methanol** in manuf. of hydrogen)
- IT 7732-18-5, Water, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(**reforming catalysts for steam reforming**  
of **methanol** in manuf. of hydrogen for fuel cells)

L30 ANSWER 5 OF 6 CAPLUS COPYRIGHT 2004 ACS on STN

ACCESSION NUMBER: 2000:815115 CAPLUS

DOCUMENT NUMBER: 133:352477

TITLE: Catalyst for synthesis gas manufacturing from  
**methanol reforming**

INVENTOR(S): Hayakawa, Takashi; Suzuki, Kunio; Hamakawa,  
Satoshi;

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PATENT ASSIGNEE(S): Murata, Kazuhisa; Shima, Yoshitaka; Ishii, Tomoko;  
 Japan; Kumagaya, Mikio  
 Agency of Industrial Sciences and Technology,  
 Sangyo Sozo Kenkyusho K. K.  
 SOURCE: Jpn. Kokai Tokkyo Koho, 6 pp.  
 CODEN: JKXXAF  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2000317308	A2	20001121	JP 1999-119519	19990427
JP 3243495	B2	20020107		
			JP 1999-60497	A

PRIORITY APPLN. INFO.:  
 19990308

AB The **reforming** catalyst for decomp. MeOH to produce CO/H<sub>2</sub> mixed gases comprises (i) Ce/Pd/Zr composite metal oxides of formula: Ce<sub>1-x-y</sub>Pd<sub>x</sub>Zr<sub>y</sub>O<sub>2-x·m</sub>H<sub>2</sub>O (x = 0.05-0.7; y = 0.05-0.8; m = 0-10), and (ii) hydrogenation treatment products of the composite metal

oxides, by redn. with H<sub>2</sub> at 200-600° under H<sub>2</sub> pressure 0.05-1.5 atm. for 60-240 min to convert Pd oxides into elemental Pd. The catalyst

is durable and and effective for decomp. MeOH to produce synthesis gas mainly contg. CO and H<sub>2</sub>.

IC ICM B01J023-63  
 ICS C01B003-40

CC 51-9 (Fossil Fuels, Derivatives, and Related Products)  
 Section cross-reference(s): 67

ST catalyst synthesis gas manufg **methanol reforming**;  
 cerium palladium zirconium oxide catalyst **methanol reforming**

IT **Reforming** catalysts  
 (Ce/Pd/Zr composite metal oxides-based; for synthesis gas manufg. from

**methanol reforming**)

IT Synthesis gas manufacturing  
 (catalyst for synthesis gas manufg. from **methanol reforming**)

IT 92068-66-1 **306769-57-3**, Cerium palladium zirconium oxide (Ce<sub>0.6</sub>Pd<sub>0.25</sub>Zr<sub>0.15</sub>O<sub>1.75</sub>) **306769-58-4**, Cerium palladium zirconium oxide (Ce<sub>0.7</sub>Pd<sub>0.15</sub>Zr<sub>0.15</sub>O<sub>1.85</sub>) **306769-59-5** **306769-60-8**  
**306769-62-0**

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RL: CAT (Catalyst use); USES (Uses)  
 (catalyst for synthesis gas manufg. from **methanol**  
**reforming**)

IT 630-08-0P, Carbon monoxide, preparation 1333-74-0P, Hydrogen,  
 preparation

RL: IMF (Industrial manufacture); PEP (Physical, engineering or  
 chemical

process); PREP (Preparation); PROC (Process)  
 (catalyst for synthesis gas manufg. from **methanol**  
**reforming**)

IT 67-56-1, **Methanol**, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)  
 (catalyst for synthesis gas manufg. from **methanol**  
**reforming**)

L30 ANSWER 6 OF 6 CAPLUS COPYRIGHT 2004 ACS on STN

ACCESSION NUMBER: 1992:8282 CAPLUS

DOCUMENT NUMBER: 116:8282

TITLE: Membrane reactors for dehydrogenation

INVENTOR(S): Imai, Tetsuya; Kuroda, Kennosuke

PATENT ASSIGNEE(S): Mitsubishi Heavy Industries, Ltd., Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 5 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
-----	----	-----	-----	-----
JP 03217227	A2	19910925	JP 1990-12645	19900124
			JP 1990-12645	

PRIORITY APPLN. INFO.:

19900124

AB The reactor is equipped with a feed inlet, a product outlet, a  
 H-removing

device consisting of a porous metal catalyst holder with 0.1-20 .  
**mu.m pores** having a Pd-based H-sepn. membrane with  
 thickness  $\leq 50 \mu\text{m}$  at least partly on the surface, a catalyst, and  
 a heating device placed outside. Thus, SUS 304 powder with av. diam.

1  $\mu\text{m}$  was molded into a pipe (outside diam. 10 mm, inside diam. 8 mm,  
 length 500 mm) with av. pore diam. 0.5  $\mu\text{m}$ , metalized with Pd on its  
 outer side to 10  $\mu\text{m}$  thickness, filled with a catalyst with av. diam.

1 mm contg. 20% NiO and 80% Al<sub>2</sub>O<sub>3</sub>; placed in a reactor, and the  
 catalyst was

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reduced with H at 500°. Reforming of a 1:3 (mol) CH<sub>4</sub>-H<sub>2</sub>O mixt. in the membrane reactor at 5 kg/cm<sup>2</sup> and 500° with Ar as sweep gas proceeded with 95% conversion of CH<sub>4</sub> vs. 24% in the absence of the Pd membrane.

- IC ICM B01J008-02  
ICS C07C005-333; C07C011-00; C07C015-46  
ICA B01J023-74; C01B003-26; C01B003-38; C01B003-58; C07B061-00  
CC 47-3 (Apparatus and Plant Equipment)  
Section cross-reference(s): 45, 51  
IT **Reforming**  
(steam, of methane, membrane reactors for)  
IT 1314-13-2, Zinc oxide (ZnO), uses  
RL: CAT (Catalyst use); USES (Uses)  
(catalyst, contg. alumina and calcium oxide and potassium chromate  
and potassium sulfate, for dehydrogenation of ethylbenzene, membrane  
reactors contg.)  
IT 7778-80-5, Potassium sulfate, uses  
RL: CAT (Catalyst use); USES (Uses)  
(catalyst, contg. alumina and calcium oxide and potassium chromate  
and zinc oxide, for dehydrogenation of ethylbenzene, membrane reactors  
contg.)  
IT 7789-00-6, Potassium chromate  
RL: CAT (Catalyst use); USES (Uses)  
(catalyst, contg. alumina and calcium oxide and potassium sulfate  
and zinc oxide, for dehydrogenation of ethylbenzene, membrane reactors  
contg.)  
IT 1305-78-8, Calcium oxide, uses  
RL: CAT (Catalyst use); USES (Uses)  
(catalyst, contg. alumina and potassium chromate and potassium  
sulfate and zinc oxide, for dehydrogenation of ethylbenzene, membrane  
reactors contg.)  
IT 1308-38-9, Chromia, uses  
RL: CAT (Catalyst use); USES (Uses)  
(catalyst, contg. alumina, for dehydrogenation of butane, membrane  
reactors contg.)  
IT 7440-06-4, Platinum, uses  
RL: CAT (Catalyst use); USES (Uses)  
(catalyst, contg. alumina, for dehydrogenation of propane, membrane  
reactors contg.)  
IT 1313-99-1, Nickel oxide (NiO), uses

RL: CAT (Catalyst use); USES (Uses)  
(catalyst, contg. alumina, membrane reactors contg., for steam  
reforming of methane)

IT 1344-28-1, Alumina, uses  
RL: CAT (Catalyst use); USES (Uses)  
(catalyst, contg. nickel oxide, membrane reactors contg., for  
steam reforming of methane)

IT 7732-18-5, Water, vapor  
RL: USES (Uses)  
(in reforming of methane, membrane reactors for)

IT 7440-05-3, Palladium, uses 12665-15-5 50941-20-3  
RL: USES (Uses)  
(metalized on porous catalyst holder, reactors contg., for  
dehydrogenation of hydrocarbons)

IT 74-82-8, Methane, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(reforming of, by steam, membrane reactors for)

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